

MARK SCHEME for the May/June 2014 series

0581 MATHEMATICS

0581/43

Paper 4 (Extended), maximum raw mark 130

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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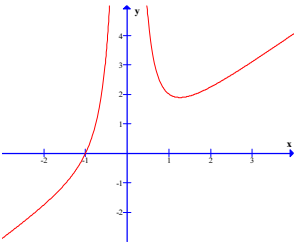
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Abbreviations

- cao correct answer only
- dep dependent
- FT follow through after error
- isw ignore subsequent working
- oe or equivalent
- SC Special Case
- nfww not from wrong working
- soi seen or implied

Qu		Answers	Mark	Part Marks
1	(a)	62100[.00] Final answer	2	B1 for 62 074[. 35] or 62 070
	(b)	39300	3	M2 for $45\,981 \div 1.17$ oe or M1 for 45 981 associated with 117 [%]
	(c)	20436	2	M1 for $45\,981 \div (3+4+2)$ or $45\,981 \times 4$
	(d)	4	3	M2 for $\frac{1.5 \times 1000}{330}$ oe or M1 for figs 4545... or 455
	(e)	25545	2	M1 for $45\,981 \times \frac{5}{9}$
2	(a)	$10 < x \leq 25$ $25 < x \leq 30$ $30 < x \leq 35$ $35 < x \leq 50$ $50 < x \leq 60$	2	5 correct B1 for 3 or 4 correct or SC1 for all correct but in the form 10 to 25 or 10 – 25
	(b)	13 33 19 [4] 15 6 25.1[0] or 25.13 to 25.14 nfww	3 4	B2 for 4 correct or B1 for 3 correct M1 for mid-values soi, condone one error or omission 5 17.5 27.5 32.5 42.5 55 soi and M1 for $\sum fx$ for any x in intervals including boundaries, but all fs must be integers, condone one further error or omission and M1 dep for $\sum fx \div 90$ Dep on 2nd M mark earned

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Qu		Answers	Mark	Part Marks
3	(a) (i)	72[.0] or 71.98 to 71.99 nfw	3	M2 for $[\sin P =] \frac{97}{\frac{1}{2} \times 12 \times 17}$ oe or M1 for implicit version
	(ii)	16.2 or 16.18 to 16.19 nfw	4	M2 for $6^2 + 17^2 - 2 \times 6 \times 17 \times \cos(\text{their } 72)$ or M1 for implicit form and A1 for $[XR^2 =] 261.8$ to 262
	(b)	7.61 or 7.612... nfw	4	M3 for $[a =] 9.4 \times \sin 37 \div \cos 42$ oe or $[a =] 9.4 \sin 37 / \sin(90 - 42)$ or M2 for $[a =] \text{their height} \div \cos 42$ oe or $\frac{a}{\sin 37} = \frac{9.4}{\sin(90 - 42)}$ oe or M1 for their height $\div a = \cos 42$ or for [their height =] $9.4 \times \sin 37$ oe or B1 for 48° correctly used or seen in correct position on diagram
	(c)	50 130	1 1	
4	(a)	0, 4.5, 3.11[1...]	3	B1, B1, B1
	(b)	Complete correct curve with minimum below $y = 2$ 	5	B3 FT for 9 points correctly plotted B2 FT for 7 or 8 points correctly plotted or B1 FT 5 or 6 points correctly plotted and B1 indep two separate branches not touching or cutting y-axis
	(c)	- 0.5 to - 0.6 0.6 to 0.7 2.8 to 2.9	1 1 1	if 0 SC1 for $y = 3$ indicated
	(d)	Correct line or no line and - 0.7 to - 0.6 nfw	3	Must check line - not if wrong line B2 for $y = 1 - x$ ruled correctly or SC1 for ruled line with either gradient -1 or y-intercept 1 but not line $y = 1$ or correct freehand line

Qu		Answers	Mark	Part Marks
6	(a) (i)	$\frac{1}{6}$	1	
	(ii)	$\frac{4}{6}$ oe	1	
	(iii)	$\frac{2}{6}$ oe	1	
	(b)	$\frac{16}{36}$ oe	3	M2 $\frac{2}{6} \times \frac{4}{6} + \frac{4}{6} \times \frac{2}{6}$ only oe or M1 for one of $\frac{2}{6} \times \frac{4}{6}$ or $\frac{4}{6} \times \frac{2}{6}$ soi by $\frac{2}{9}$
	(c)	$\frac{48}{360}$ oe	3	M2 for $\frac{4}{6} \times \frac{3}{5} \times \frac{2}{4} \times \frac{2}{3}$ only oe or M1 for denominators 6, 5, 4, 3 soi in product of four fractions
7	(a) (i)	148	1	
	(ii)	122	2	B1 for 58 seen at <i>A</i> or 32 seen at <i>Y</i>
	(iii)	148	1	
	(iv)	106 nfw	3	B1 for [sum of interior angles =] 720 and M1 for $\frac{1}{2} \{(their\ 720) - (p+q+t+90)\}$
	(b) (i)	63	2	B1 for angle <i>RPS</i> = 27 or 90 at <i>P</i> or at <i>S</i> seen or stated
	(ii)	54	2	B1 for <i>their x</i> or 63 or letter <i>x</i> at <i>Q</i> seen or state

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Qu		Answers	Mark	Part Marks
8	(a) (i)	$7 \times 2 + (2x - 3)(x + 4) = 2(x + 4)$ $2x^2 + 8x - 3x - 12$ or better seen $2x^2 + 3x - 6 = 0$	M1 B1 A1	Allow if bracket[s] omitted but recovered with no errors seen and brackets correctly expanded on both sides and no omission of brackets
	(ii)	$\sqrt{(3)^2 - 4(2(-6))}$ or better $p = -3$ and $r = 2(2)$ 1.14 and -2.64 cao	B1 B1	or $\left(x + \frac{3}{4}\right)^2$ Must see $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ or both Or $-\frac{3}{4} +$ or $-\sqrt{\frac{57}{16}}$
	(b)	$\pi \times x^2 + \pi \times x \times 3x$ $4[\pi]x^2 = [\pi]r^2$ $2x = r$	M2 M1 A1	or M1 for $\pi \times x \times 3x$ Dep on M2 with no errors seen
9	(a)	$4 - 6x$ final answer	1	
	(b)	$9x - 8$ final answer	2	M1 for $4 - 3(4 - 3x)$ seen
	(c)	$\frac{1}{27}$ final answer	3	M2 for 3^{-3} soi by final answer 0.037037... to 3sf or better or M1 for $[g(-1) =] 3$ soi
	(d)	$\frac{4-x}{3}$ oe final answer	2	M1 for a correct first step $3x = 4 - y$ oe or $x = 4 - 3y$ or $\frac{y}{3} = \frac{4}{3} - x$
	(e)	$\frac{4}{3}$ or $1\frac{1}{3}$ or 1.33 or better	3	M2 for $3x - 4 = 0$ or better or M1 for $3^{-(4-3x)}$

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Qu		Answers	Mark	Part Marks
10	(a)	$[r =] 2.30[9\dots]$	3	B2 for $[r =] 2.31$ or M2 for $4 \tan 30$ or M1 for $\frac{r}{4} = \tan 30$
	(b)	333 or 332.5 to 332.6	4	M3 for $0.5 \times 8 \times 8 \times \sin 60 \times 12$ oe or M2 for $0.5 \times 8 \times 8 \times \sin 60$ oe or M1 for <i>their</i> triangle area $\times 12$ shown dep on ' $\frac{1}{2}$ ' used within <i>their</i> area of triangle method
	(c) (i)	30	3	M2 for $12 \div 0.4$ or $120 \div 4$ or SC1 for figs 3
	(ii)	6.65 or 6.647 to 6.648[...]	2	M1 for $\pi \times 2.3^2 \times 0.4$ or SC1 for $\pi \times 2.3^2 \times 4$ soi by 66.5 or 66.47 to 66.48[...]
	(iii)	40[.0] or 40.1 or 40.0 to 40.2 nfw	3	M2 for $100 - \frac{\text{their}(c)(i) \times \text{their}(c)(ii)}{\text{their}(b)} \times 100$ or $\frac{\text{their}(b) - \text{their}(c)(i) \times \text{their}(c)(ii)}{\text{their}(b)} \times 100$ or M1 for $\frac{\text{their}(c)(i) \times \text{their}(c)(ii)}{\text{their}(b)} \times 100$ or $\frac{\text{their}(b) - \text{their}(c)(i) \times \text{their}(c)(ii)}{\text{their}(b)}$
11	(a)	$\frac{1}{8} \frac{1}{16} \frac{1}{32}$	2	B1 for 2 correct
		$\frac{1}{2^{n-1}}$ oe	2	SC1 for $\frac{1}{2^n}$ oe
		$2^{-3} 2^{-4} 2^{-5}$	1	
		2^{1-n} or $2^{-(n-1)}$	1	
	(b) (i)	64 256 1024	1	
	(ii)	$2^6 2^8 2^{10}$	1	
(c)	$2^{2(n-1)}$ or 2^{2n-2}	1		
	(c)	16384	2	B1 for $n = 8$